

early life of young men, when it is so important that their attention should be directed to original research, is a new feature in this institution, and permit me to say, however important the institution may be in other respects, I am not sure that it is not one of the most important of its features."

It will be seen that while Prof. Huxley acknowledged the necessity for the endowment of unremunerative research, speaking as a Royal Commissioner, he acknowledged also that there are difficulties which surround the solution of the question. We are glad of this, because if the things were easy it would certainly not require that the machinery of a Royal Commission such as the one now sitting should be set in motion; nor, let us add, would it be worth Prof. Huxley's attention. In the fact that the question is a difficult one we see the best justification for the best minds in the country being brought to bear upon it, and we may safely anticipate a satisfactory solution.

THE REPORT OF THE METEOROLOGICAL COMMITTEE

Report of the Meteorological Committee of the Royal Society for the Year ending December 31, 1873.
(London, 1874.)

THE proceedings of the Meteorological Committee of the Royal Society for 1873 are detailed in the above Report. The discussion of the meteorology of the district of the Atlantic Doldrums, known as Square 3, has now been completed, and this piece of work, which the Committee consider may fairly be termed a monograph for the district, will shortly be published. The examination of the eight squares adjacent to Square 3 has already been entered upon. The discussion of the results of Sir J. Ross's Antarctic expedition, from the observations made on board H.M.S. *Erebus* and *Terror* in 1840-43 and H.M.S. *Pagoda* in 1845, has also been completed and published, and is a paper of considerable value. Another good piece of work done by the Office is the examination, at the request of the Astronomer Royal, of the observations bearing on the meteorology of Kerguelen Island for the month of December, the results of which have been forwarded to those who are now stationed there to observe the transit of Venus.

We are glad to see that an increasing regularity in the receipt of the Weather Telegraphic Reports is notified, and we very cordially join in the regret expressed by the Committee that the Post Office authorities have declined to extend the telegraph wires so that a station might be established at Mullaghmore, near Sligo. In consequence of this action or want of action on the part of the Post Office, the Meteorological Office continues to be without daily information along the whole of the important and extended line of coast from Valencia to Lough Foyle. We hope that this blank will soon be filled up, and further, that some arrangement will be entered into by which a constant service will be maintained on the west coasts of these islands, and also at the Head Office in London; for until this be carried out, our system of weather telegraphy must, of necessity, not unfrequently fail to give warning of approaching storms. A comparison has been instituted, as in the three previous years, between the warnings issued and the weather experienced on our

coasts, with the general result that the total success of warnings for 1873 was 79.2 per cent. as compared with 80.5 per cent. for 1872. In 1870 and 1871 the percentages of success were 68.4 and 63.7 respectively. The mean of these four years is nearly the same as that of the last two years when the office was under Admiral Fitzroy's management, but it will be observed that 1872 and 1873 show the largest number of successful warnings.

The restoration of Admiral Fitzroy's system of warnings, so far as to announce in the warning-message the probable direction of the apprehended storm, is a step which, we see at p. 51 of the "Report on Weather Telegraphy and Storm Warnings, presented to the Congress at Vienna," was strongly urged by the council of the Scottish Meteorological Society upwards of a year ago. The practical restoration of Fitzroy's system has been effected by the Committee, and the change took effect in March last, with, however, the very decided improvement of employing the drum simply to emphasize the warning given by the cone, instead of denoting, as it did originally, "dangerous winds from nearly opposite quarters successively." The Committee have attempted to assign the degree of probability to a storm announced by signal, thus: "Hitherto it has been found that at least *three* out of *five* signals of approaching storms (force upwards of 8 Beaufort scale, a fresh gale), and *four* out of *five* signals of approaching strong winds (force upwards of 6 Beaufort scale, a strong breeze), have been fully justified." We observe with some interest that the Committee have directed that tentative forecasts should be prepared daily in the office, and compared with the facts experienced subsequently, and that they hope ere very long to be able to afford the public the benefit of the information. For the successful development of the important question of weather probabilities, it will be necessary that the Committee investigate weather changes over a much wider area than is covered by the daily weather charts. In this direction, the reports begun to be received during 1873 from Sweden and Denmark will prove to be of considerable utility; but for the success of the experiment it will be necessary that daily reports be also received from points in the north-west of Russia, and in Germany, Austria, and Switzerland.

The anemometrical returns from Bermuda for four years have been published. These observations, and similar observations made at Sandwich, Orkney, previously published by the Committee, have been discussed by a method which cannot be recommended. The results are worth little, and altogether inadequate to the expense incurred in their discussion. The discussion of no meteorological data at all approaches in difficulty that of wind observations, and it is necessary at the outset to apprehend the difficulties to be overcome.

In several cases the language used in the Report is inexact and tends to mislead. Thus an excess of high winds on the coast of Scotland during 1873, and a deficiency on the coasts further south, are stated to be explained by the circumstance that in 1873 "the paths of the storm centres lay to the northward of the British Isles, so that our stations felt the barometrical and other meteorological disturbances, but were not exposed to the full force of the wind." Now, as is pretty well known among

meteorologists, in previous years the immense majority of British storms have had their centres to the northward of the British Isles. The proximate cause of the peculiar distribution of storms of wind during 1873 lay not in the position of the paths of the storm-centres, but in the manner of the distribution over Great Britain of the steeper barometric gradients of the atmospheric depressions of the storms of 1873 as they swept eastwards over north-western Europe.

It would have been satisfactory if the comparison which has been instituted by the Office between the observations from Valencia, in Ireland, and Angra do Heroísmo, in the Azores, had been detailed in the Report, seeing that it is inferred from the result, "beyond the possibility of a doubt, that reports from a station situated at the Azores would be practically useless to the Office in giving early intimation of approaching storms." The grounds of this strongly-expressed opinion on a point of some importance in weather telegraphy, and contrary to the views entertained by not a few meteorologists, ought to have been stated.

In the Committee's Quarterly Weather Report for 1870 the position of the thermometers at each of their seven observatories was described and figured. We hope that in the next Report a detailed account will be given of the position and exposure of the thermometers at the stations from which the daily telegraphic weather reports are sent, in order that meteorologists may judge how far the observations made at these stations might be available in investigating the climate of the British Isles, and in some other meteorological inquiries. This is by many deemed necessary, especially when it is considered that the Office has not hitherto published any mean temperatures from the daily observations made at their telegraphic stations, and some of these stations, particularly in Ireland, are in parts of the British Isles, of whose climate little is yet known.

GEOLOGY AND AGRICULTURE

Applications de Géologie et l'Agriculture, par M. Amédée Burat, Engineer, Professor at the Central School of Arts and Manufactures. (Paris: Rothschild, 1874.)

GEOLOGY is one of the most interesting of modern sciences. Soon after it assumed shape high hopes were entertained as to its value to the farmer: up to the present these hopes have not been realised. And yet the study of geology is most intimately connected with agricultural pursuits. Surface geology deals with the soil which daily occupies the thoughts and labours of the farmer. There is one phase of surface geology which has been almost wholly neglected of late; we refer to the connection between soils and the rock-formations from which soils have been derived. It is here possibly that there is the widest field for original research. It was hoped that this branch of agricultural science would have received much attention from the present secretary to the Royal Agricultural Society of England, who had previously been a diligent student of geology and secretary to the Geological Society. So far, his hands would appear to have been full of other work, and he has done little where much was expected.

That there is a most intimate connection between soils and rock-formations is well known. In some places the soil is the direct product of the disintegration of the underlying rock. It more frequently happens, however, that the soil has not been derived from the rock on which it rests, but consists of drifted material. The study of this drifted material is most interesting to the geologist, and ought to be most instructive to the farmer. It enables the geologist to understand the direction and force of former water-currents; and thus throws light on obscure phenomena. A careful examination of the drift enables us to trace the origin of the soil. Thus, for example, a study of the stones and pebbly particles of the soil, enables us not only to know the rocks from which it was derived, at all events partly, but also to understand the rate at which plant-food may become liberated on the soil by the disintegration of these very stones and pebbles. On this point a word of explanation may be here offered.

If we examine a fertile soil at any time we shall find that only a very small portion of its substance (seldom more than one per cent.) is in a condition fit for nourishing our crops, the great bulk of its substance being locked up in a condition at the moment unavailable. By the action of air, of moisture, of heat, and of manure, part of this unavailable matter becomes available for crops. It is on the rate at which the process of disintegration—or liberation of plant-food—takes place that the *natural* power of production of the soil chiefly depends. The study of agricultural geology from this point of view is manifestly of the highest scientific and practical importance: it opens up a wide field for original research. We had hoped, on receiving M. Burat's little volume, that he would have taken up the subject. We have been disappointed.

The work is, not, however, without merit. The language is simple, and the style as lucid as need be.

In the introduction the author leads the reader to expect a fuller exposition of the relation between geology and practical farming than he will find in the volume. The book contains four chapters. The first is a disquisition, couched in very general terms, on the physical characters and composition of soils. As an illustration of the very general character of the matter we quote the average composition of fertile soils (p. 8):—

Every 100 parts contain—

35	gravelly particles of the size of peas
45	ditto ditto millets
10	ditto of fine sand
10	ditto of fine material, separable by washing.

We are next furnished with a general "ultimate" chemical composition of an average soil. Information of this kind possesses no value except to the junior student.

The second chapter is devoted to manures, which are treated in a popular manner. The third chapter is on the action of water, and the subject is treated in an interesting manner; the services of the Abbé Paramere are duly acknowledged. The fourth, and last, is the most interesting chapter in the work. Here the author shows very clearly that there is a connection between geology and agriculture, drawing illustrations from the primary, secondary, and tertiary groups of rocks. Soils formed from granitic